

ERATOSTHENES Centre of
Excellence (ECoE)



1st virtual EXCELSIOR International Technical Workshop

15 July 2020

A satellite ground station to support environmental research and maritime security

@excelsior2020eu



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DLR



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857510



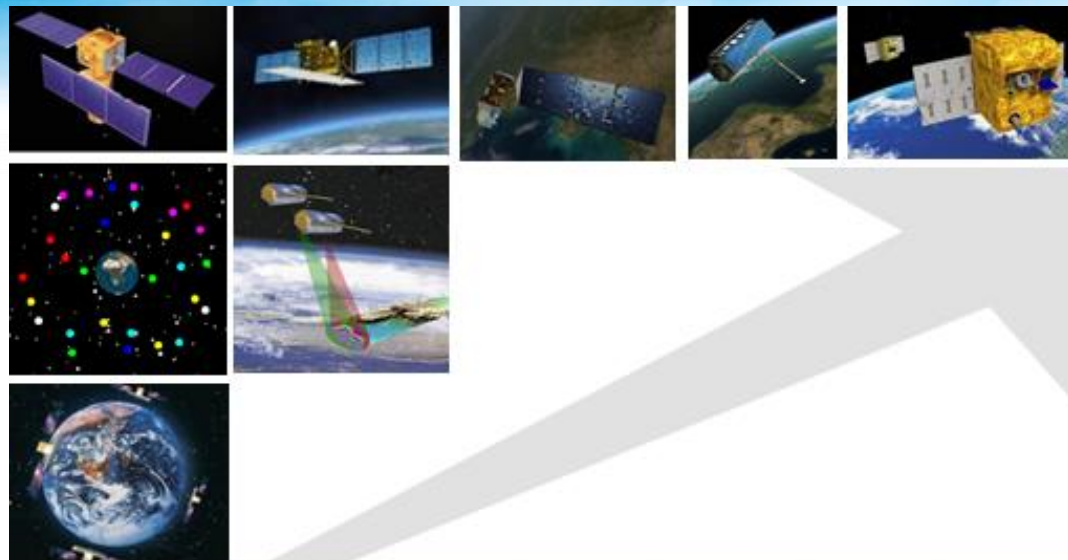
This project has received funding from the Government of the Republic of Cyprus through the Directorate General of the European's Programmes, Coordination and Development

CONSORTIUM



Background Space Capabilities

- Number of Satellites and Satellite Constellations increase
- Higher Number of small satellites, with lower costs of manufacture, launch, and operations
 - e.g., ICEYE, Capella Space, PredaSAR, planet,
- Increased revisit time and flexibility
- Higher Coverage update and higher image resolution
- Higher service reliability
 - More data
 - New Products
 - Shorter response time
 - More downlink capability



Operational Satellites Application	2015	2016	2017	2018
Earth Observation	333	374	596	710
Communications	705	713	742	777
Technology Demonstration	141	160	193	223
Navigation and Global Position	91	105	108	137
Space Science	65	67	67	85

<http://www.pixalytics.com>

Motivation

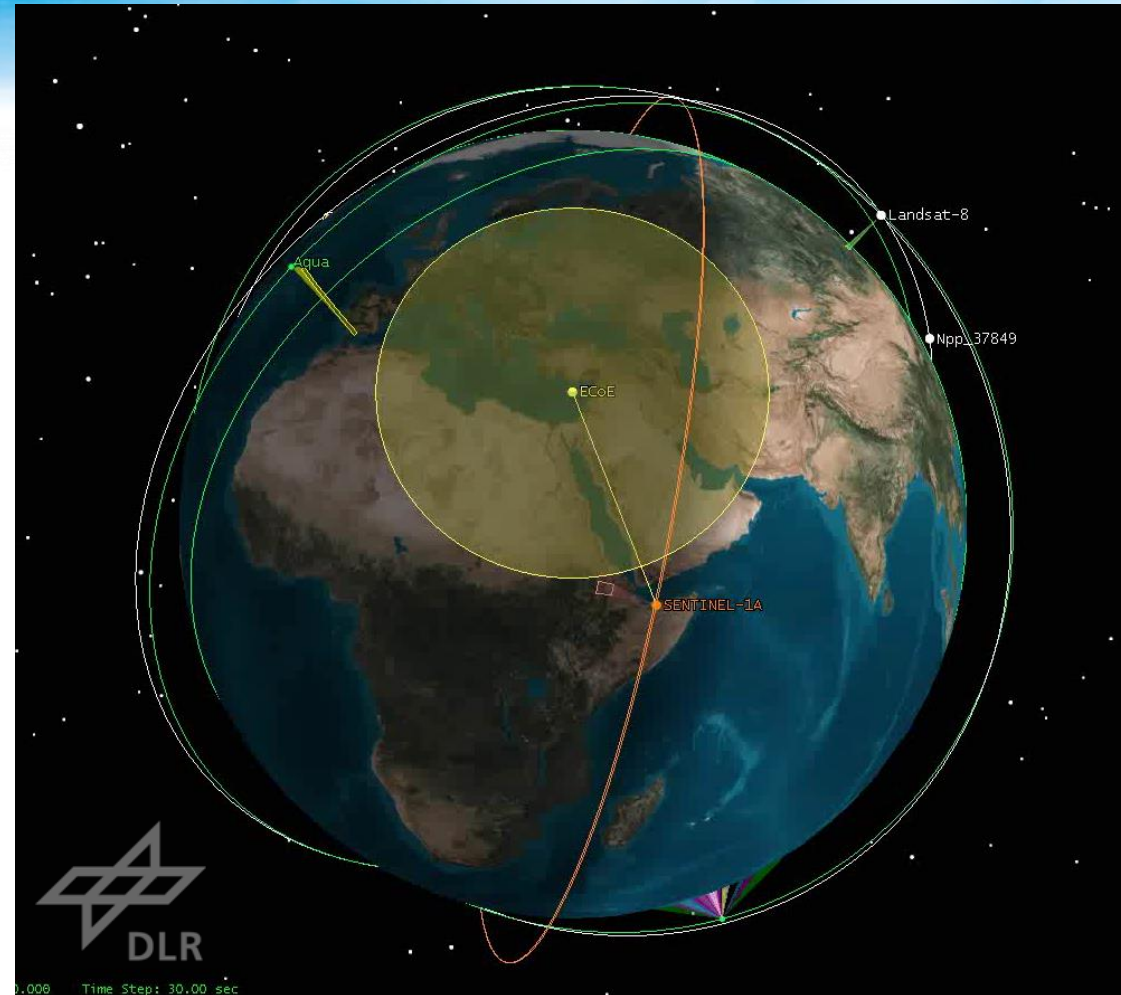
- Unique geolocation for remote sensing in the south eastern Mediterranean region
- Use Case: Support Maritime Situational Awareness
 - One of the most dense shipping routes in the world connecting Middle East and Northern Africa and Europe resulting in more than 200 thousand merchant vessels passages per year
 - Exploration and development of new energy sources increases the needs for **maritime safety** and **environmental monitoring**



<https://www.fleetmon.com/services/live-tracking/fleetmon-explorer/>

Unique geolocation for remote sensing

- Unique geolocation for remote sensing and most eastern European (i.e. EU/Copernicus) station
- Enable Near Real Time (NRT) coverage of central and eastern Mediterranean Sea
- NRT visibility to middle east
 - coverage of Red Sea and Persian Gulf,
 - Black Sea, Caspian Sea



Example: sun-synchronous orbit

Unique geolocation for remote sensing

Example: non sun-synchronous orbit

ICEYE-X3, Inclination 40.0 degree

- Official Name **HARBINGER**
- Launch Date 5. May 2020
- Altitude 509 km
- Inclination 40.0 deg
- Operational Status Active

EGYPTSAT_2, Inclination 51.0 degree

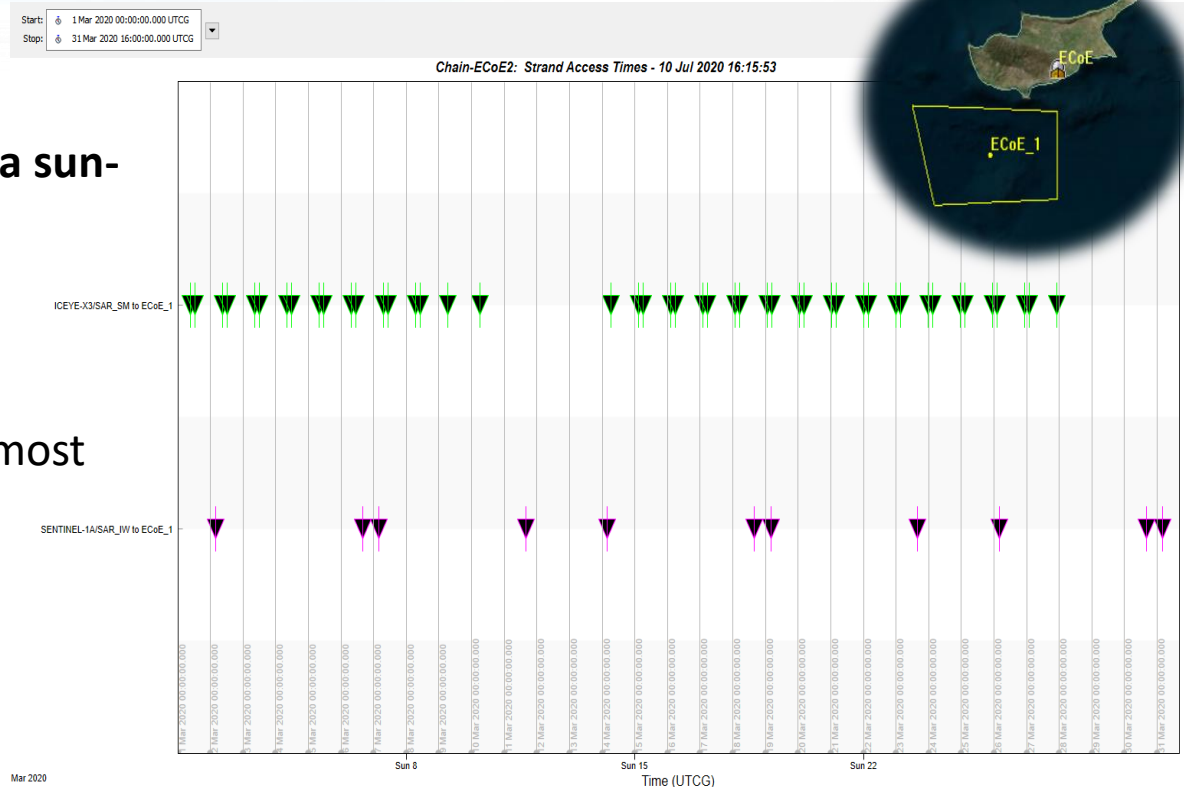
- Launch Date 16. April 2014
- Altitude 703 km
- Inclination 51.6 deg
- Operational Status out of order



Unique geolocation for remote sensing

Example: non sun-synchronous orbit

- The lower inclination leads to an increased revisit time, compared to a sun-synchronous orbit
- non sun-synchronous orbit
 - Example ICEYE-3, ~ 46 contact within a month, almost two times per day
- sun-synchronous orbit
 - example Sentinel-1A, ~ 11 contacts within a month

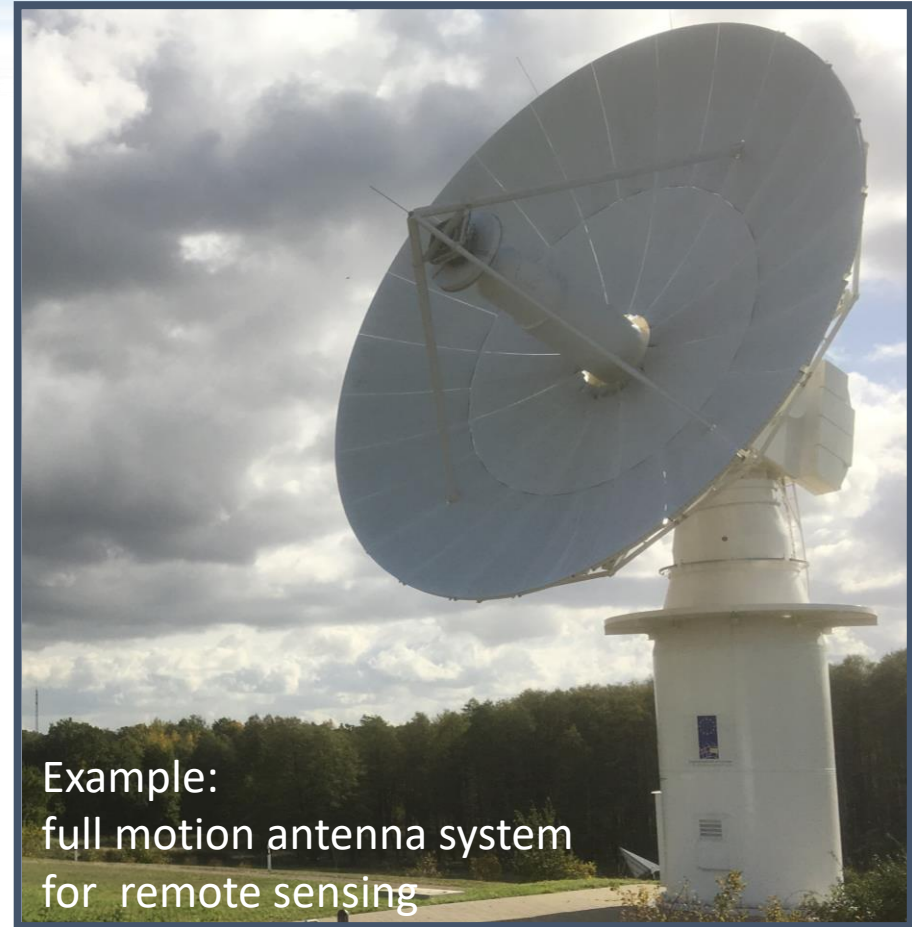
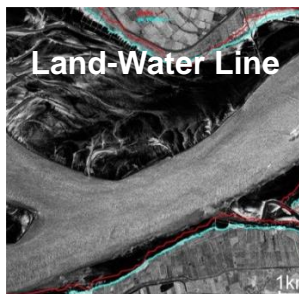
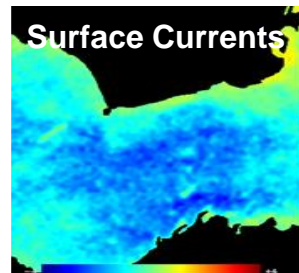
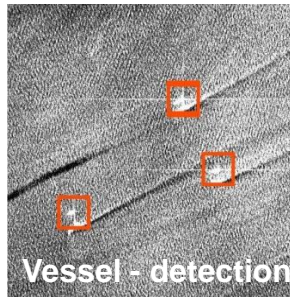
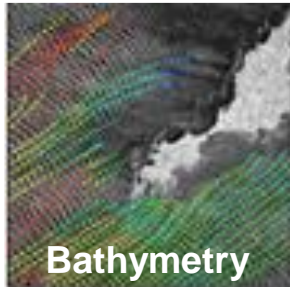
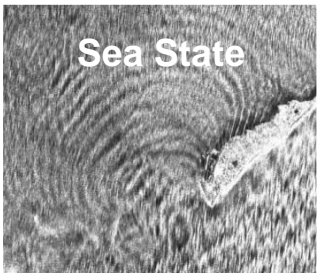
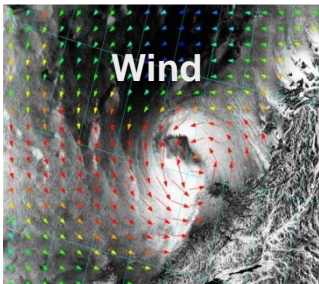


Maritime Service Domain

- Environmental Monitoring
- Fisheries Control
- Search and Rescue
- Law Enforcement (illegal oil spill, illegal fishing)
- Anti-Piracy
- Anti- Trafficking
- Maritime border surveillance



Scientific Issues to Support Maritime Security and Environmental Monitoring



THANK YOU FOR YOUR ATTENTION

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The project EXCELSIOR has received funding under Horizon 2020
WIDESPREAD-01-2018-2019: Teaming Phase 2
Coordination and support action
Grant agreement No. 857510
Proposal acronym: EXCELSIOR



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